

VOLUME ONE

CURATING RESEARCH DATA

Practical Strategies for Your Digital Repository



EDITED BY LISA R. JOHNSTON



Curating Research Data

Volume One: Practical
Strategies for Your Digital
Repository

edited by
Lisa R. Johnston

Association of College and Research Libraries
A division of the American Library Association
Chicago, Illinois 2017

The paper used in this publication meets the minimum requirements of American National Standard for Information Sciences—Permanence of Paper for Printed Library Materials, ANSI Z39.48-1992. ∞

Cataloging-in-Publication data is on file with the Library of Congress

Copyright ©2017 by the Association of College and Research Libraries.
All rights reserved except those which may be granted by Sections 107 and 108 of the Copyright Revision Act of 1976.

Printed in the United States of America.

21 20 19 18 17 5 4 3 2 1

Cover image

Copyright: kentoh / 123RF Stock Photo (http://www.123rf.com/profile_kentoh)

Table of Contents

1Introduction to Data Curation

Lisa R. Johnston

Data, Data Repositories, and Data Curation: Our Terminology

Why We Curate Research Data

The Challenge of Providing Data Curation Services

Reuse: the Ultimate Goal of Data Curation?

Conclusion

Notes

Bibliography

Part I. Setting the Stage for Data Curation. Policies, Culture, and Collaboration

33Chapter 1. Research and the Changing Nature of Data Repositories

Karen S. Baker and Ruth E. Duerr

Introduction

Background

Changing Support for Data

Expanding Support for Data in Natural and Social Sciences

Data Repository Diversity

Three Concepts at Work

Data Ecosystem: Growing Interdependence

Liaison Work and Mediation

Continuing Design: Standards, Systems, and Models

Changing Research Needs and New Initiatives

Final Thoughts

Notes

Bibliography

61Chapter 2. Institutional, Funder, and Journal Data Policies

Kristin Briney, Abigail Goben, and Lisa Zilinski

Funding Agency Data Policies

Institutional Data Policies

Journal Data Policies

Navigating the Data Policy Landscape for Curation

Summary

Notes

Bibliography

**79Chapter 3. Collaborative Research Data Curation
Services: A View from Canada**

Eugene Barsky, Larry Laliberté, Amber Leahey, and Leanne Trimble

Canadian Academic Library Involvement in Research Data

Management

Overview of Case Studies

Local Services: University of Alberta Libraries

Informal Regional Consortia: University of British Columbia Library

*Formal Regional Consortia: The Ontario Council of University
Libraries*

Data Repository Services in Canadian Libraries

Discovery and Access Platforms

Long-Term Preservation

Operational Costs of Data Repository Services

National Collaboration: Portage

Goal 1: Portage National Data Preservation Infrastructure

Goal 2: Portage Network of Expertise

Future Directions

Conclusions

Notes

Bibliography

**103Chapter 4. Practices Do Not Make Perfect: Disciplinary
Data Sharing and Reuse Practices and Their
Implications for Repository Data Curation**

Ixchel M. Faniel and Elizabeth Yakel

Introduction

Overview and Methodology for the DIPIR Project

Disciplinary Traditions for Data Sharing and Reuse

Social Scientists

Archaeologists

Zoologists

Data Reuse and Trust

Trust Marker: Data Producer

Trust Marker: Documentation

Trust Marker: Publications and Prior Reuse Indicators

Trust Marker: Repository Reputation

Sources of Additional Support for Data Reuse

Social Scientists

Archaeologists

Zoologists

Implications for Repository Practice

Conclusion

Acknowledgments

Notes

Bibliography

127Chapter 5. Overlooked and Overrated Data Sharing: Why Some Scientists Are Confused and/or Dismissive

Heidi J. Imker

Data Sharing in Context

Overlooked Data Sharing: Article Publication

Overlooked Data Sharing: Supplemental Material

Overrated Data Sharing: Unsustained Community Resources

Overrated Data Sharing: Hyperbolic Arguments

Conclusions

Acknowledgments

Notes

Bibliography

Part II. Data Curation Services in Action

153Chapter 6. Research Data Services Maturity in Academic Libraries

Inna Kouper, Kathleen Fear, Mayu Ishida, Christine Kollen, and Sarah C. Williams

Introduction

Research Data and Libraries

The Current Landscape

RDS Maturity

Looking into the Future

Appendix 6A: Typology of Services and Their Descriptions on Websites

Notes

Bibliography

171Chapter 7. Extending Data Curation Service Models for Academic Library and Institutional Repositories

Jon Wheeler

Introduction

Conceptual Models and Rationale

Alignment with Existing Roles and Capabilities

Applications: Requirements and Example Use Cases

Defining Stakeholder Interactions and Requirements

Harvesting and Metadata Processing

Content Curation and Packaging

Conclusion

Acknowledgments

Notes

Bibliography

193Chapter 8. Beyond Cost Recovery: Revenue Models and Practices for Data Repositories in Academia

Karl Nilsen

Introduction

From Costs to Revenue

Data Repository Revenue Models

Model 1: Public or Consortium

Model 2: Freemium

Model 3: Pay-to-Play

Model 4: Pay-if-You-Can or Pay-if-You-Want

Model 5: Grants

Model 6: Outside-Data

Common Challenges Associated with Revenue Practices

Conclusion

Notes

Bibliography

**213Chapter 9. Current Outreach and Marketing Practices
for Research Data Repositories**

Katherine J. Gerwig

The Survey

The Interviews

Measuring the Success of Repository Promotions

Successful Promotional Techniques

Unsuccessful Promotional Techniques

Target Audiences

Challenges to Increasing Awareness

*Differences in Promoting the Institutional Repository and the Data
Repository*

Looking for Inspiration

Discussion

Conclusion

Promotional Examples for Inspiration

Acknowledgments

**Appendix 9A: Data Repository Promotional Practices—Initial Google
Survey**

Notes

Bibliography

**Part III. Preparing Data for the Future. Ethical and
Appropriate Reuse of Data**

**235Chapter 10. Open Exit: Reaching the End of the Data
Life Cycle**

Andrea Ogier, Natsuko Nicholls, and Ryan Speer

Introduction

Comparative Exploration

"End of Life Cycle" Terminology

Scope

Authority

Appraisal Criteria

Resources (Human, Financial, and Spatial)

Discussion*University Records and Information Management**Library Collections**Data Curation***Conclusion****Notes****Bibliography****251Chapter 11. The Current State of Meta-Repositories for Data***Cynthia R. Hudson Vitale***Introduction****Community Initiatives and Solutions to Support Meta-Repositories of Data****Methods****256 Results***Content**Functionality**Metadata***Discussion****Conclusion****Notes****Bibliography****263Chapter 12. Curation of Scientific Data at Risk of Loss: Data Rescue and Dissemination***Robert R. Downs and Robert S. Chen***Benefits of Data Rescue****Challenges of Data Rescue for Repositories****Repository Considerations for Data Rescue****Rescue of the Millennium Ecosystem Assessment (MA) Data****Dissemination of the Millennium Ecosystem Assessment (MA) Data****Lessons Learned****Discussion and Conclusion****Acknowledgments****Notes****Bibliography****279Contributor Biographies****Editor Biography****Author Biographies**



CHAPTER 2*

Institutional, Funder, and Journal Data Policies

Kristin Briney, Abigail Goben, and Lisa Zilinski

Data curation exists within a larger framework of laws and policies covering topics like copyright and data retention. These obligations must be considered in order to properly care for data as it is being created and preserved. While laws may transition slowly, the policies applying to research data by funding bodies, institutions, and journals have seen significant change since the turn of the century. These policies have directly impacted the practices of researchers and prompted the creation of data curation services by many libraries in partnership with their larger institutions.

This chapter examines three important categories of policies, primarily covered from the US perspective, that affect data curation practices in libraries: funding agency policies, institutional data policies, and journal data policies. While data professionals may be more familiar with funder and journal policies, institutional data policies are emerging as equally prevalent. Also, researchers across disciplines may encounter policies at a more granular level, such as for a specific research project or group, but these policies are less standardized and are therefore not covered in detail here.

Data policies are presently developing as researchers, institutions, funders, and journals look to improve research data management and sharing practices. As a result, standards for data policies have not yet been fully established. Potential topics covered in data policies include statements of data ownership, sharing

* This work is licensed under a Creative Commons Attribution 4.0 License, CC BY (<https://creativecommons.org/licenses/by/4.0/>).

requirements, expected retention periods, access rights, and security issues. These may appear in a stand-alone policy or in multiple policy documents depending on the policy creator. While some homogenization may develop over time, the high levels of variance between policies from different sources—funders, institutions, and journals—and even between policies from similar sources, prevent the identification of consistent policy standards that cross all disciplinary and local boundaries.

Instead, this chapter outlines the similarities and differences between the general trends in funder, institutional, and journal policies, which are critical to understand. In particular, we must understand how the inconsistencies between these three policy types can cause challenges for researchers trying to meet overlapping requirements. This chapter will briefly recap the current state of these policy three areas, identify common overlap and variances, and suggest how we, as we undertake data curation, can navigate and influence this policy landscape.

Funding Agency Data Policies

Funding agency policies have served a critical role in driving efforts on data curation as these policies primarily require researchers to preserve and share their data. While the policies themselves are mainly researcher-focused, libraries have an important role to play in this area due to their preservation expertise.

One of the first data policies by a major funding agency in the United States came from the National Institutes of Health (NIH) in 2003 and required researchers applying for direct annual costs of \$500,000 or more to create a plan for sharing their research data.¹ While this policy applied to a very limited number of grants awarded by the NIH, not including most R01 grants,² it was a clear indication that data is an important product of research that must be cared for, shared, and curated. Yet, the 2008 NIH Public Access Policy, which applied mainly to research articles, did not expand upon data as a research object to be shared.³

Then in 2011, the National Science Foundation (NSF) followed the NIH in adopting a data policy. This policy directed that all grant applications include a two-page-maximum data management plan (DMP) describing how the researchers would maintain, preserve, and make their data available.⁴ The NSF specified that this supplemental documentation must include the types of data and other materials collected, applicable standards, provisions for sharing and providing access to the data for reuse, and plans for archiving the data.⁵ More immediately impactful than the NIH policy, this policy meant that NSF grants with poor DMPs could be rejected, although the policy did not specify follow-up procedures for directorates to ensure compliance. Although the general policy applies

across the entire National Science Foundation, different divisions and directorates within the NSF could each provide more extensive policies and guidance for their individual programs. For example, the NSF Engineering Directorate required DMPs to specify the period of data retention, with a minimum requirement of three years,⁶ and the Geological Sciences Directorate Division of Ocean Sciences stated that researchers must submit their data to an appropriate data center no later than two years after data collection.⁷ The NSF policy was the inducement for many libraries to begin creating data services, not only around consulting on data management plans⁸ but also around directly curating research data to satisfy both the data preservation and sharing portions of a DMP.

The NIH and NSF policies, while applying to a considerable number of researchers, were not systemic to the US federal funding system. That change came in 2013 when the White House Office of Science and Technology Policy (OSTP) published a memorandum on public access.⁹ The OSTP memo covered not only public access to publications based on government-funded research, but also directed agencies with over \$100 million in annual research and development expenditures to require data management plans and maximize access to data from funded projects. Further, a White House Executive Order issued later in Spring 2013 required agencies to release their agency-generated data freely and in a machine-readable format, expanding the federal commitment to open and shared data.¹⁰ As of early 2016, many of the covered funding agencies have enacted new requirements in response to the OSTP memo while others have only preliminary plans for compliance.

Requirements for data management plans and data curation and sharing are not limited to the United States. The 2007 OECD “Principles and Guidelines for Access to Research Data from Public Funding” was instrumental in bringing together thirty countries under the goal of improved access to research data.¹¹ Since then, significant work has been done, such as the Horizon 2020 program out of the European Commission,¹² and additional examples from the United Kingdom and Canada highlighted here.

The Research Councils United Kingdom (RCUK) and Wellcome Trust in the United Kingdom have enacted several data requirements.¹³ These policies encourage researchers to make their data openly available as quickly as possible with a minimum number of restrictions. Similar to the US National Science Foundation, individual councils under the RCUK are also issuing their own data policies. The Engineering and Physical Sciences Research Council (EPSRC) is particularly notable in that the policy places heavy responsibility on the research organization—not just the researcher—for compliance. The policy dictates that organizations must make data openly available for a minimum of ten years with effective data curation across the data life cycle.¹⁴ A more complete list of UK funder and institutional policies is available from the Digital Curation Centre.¹⁵

Canada is also developing data management policies for federally funded research. In 2015, three major Canadian research agencies—the Canadian Institutes of Health Research (CIHR), the Natural Sciences and Engineering Research Council of Canada (NSERC), and the Social Sciences and Humanities Research Council of Canada (SSHRC)—put out a draft statement on principles of data management.¹⁶ This draft policy builds on the Canadian government’s “Action Plan on Open Government,” which supports maximizing access to federally funded research and echoes funder policies from other countries by calling for data management plans and open data sharing.¹⁷ The draft policy notably establishes the different responsibilities of researchers, research communities, institutions, and funders.

Beyond federal governments, an emerging trend among nonprofit funders is toward the requirement for data management plans and data preservation and sharing. Private nonprofit funding agencies, such as the Bill and Melinda Gates Foundation, are adopting such mandates.¹⁸ The Gates Foundation policy was seen as an especially strong funder policy when it was announced in 2014 as it required immediate and open access to all data from all funded grants.¹⁹ The following year, the Ford Foundation adopted a policy requiring all data from its sponsored grants be made available with a Creative Commons Attribution License (CC BY 4.0),²⁰ demonstrating funder interest not only in data sharing but also in allowing reuse and attribution. A major benefit of these data-sharing policies is that they require researchers to focus on better curation and management practices throughout the research process, knowing the data must be released at the end of a project.

For libraries engaged in grant writing and research, the US Institute of Museum and Library Services (IMLS) requires data sharing. The general guidelines for grants issued after December 2014 state, “If you collect and analyze data as part of an IMLS funded project, IMLS expects you to deposit data resulting from IMLS-funded research in a broadly accessible repository that allows the public to use the data without charge no later than the date upon which you submit your final report to IMLS. You should deposit the data in a machine-readable, non-proprietary digital format to maximize search, retrieval, and analysis.”²¹

The impetus behind funding agencies developing research data policies varies.²² Altruistically, the goal is to expand access to research and increase the speed and replicability of science. Another argument is to allow taxpayers access to the research that they have funded. Additionally, facing increasing budget constraints, the agencies are focused on avoiding duplicative research and gaining a full return on their funding investment through data reuse in other projects. Funding agencies also may be looking to expand the possibility of their funded research being commercialized, available to the developing world or outside of academia, and improving education.

Institutional Data Policies

With the increasing focus on data in the research and funding processes, individual academic institutions are creating and clarifying policies that outline data governance for their associated researchers. While many of these policies are more broadly concerned with intellectual property—a historic interest for universities with research resulting in patents—more research universities are starting to create stand-alone data policies. The 2013 ACRL SPEC Kit on research data management provides several examples of institutional data policies,²³ and a more recent review of 206 major research universities in the United States found that almost half had some policy covering research data—either an IP (15%) or a stand-alone data policy (29%).²⁴

In contrast with funding agency data policies, university policies are often concerned with data ownership, retention, and access.²⁵ For example, many policies describe what should happen to the research data when the researcher leaves the institution and who is allowed access to this data in the meantime. Data ownership, when explicit in the policy, is often given to the university; this is likely a by-product of the funding system in the United States, where grants are given to the university to administer (with subsequent university compliance requirements) instead of to the researcher directly.

Institutional policies are not yet universal, and there is often discrepancy between existing institutional policies, which may exceed the differences observed between funder policies. While some policies are clear and comprehensive, others may impede the ability for researchers to conduct research and collaborate with their peers.

Exemplar institutional data policies should cover research data ownership, stewardship, and expectations as well as provide clear definitions, identify access and ownership claims to the data, specify retention periods, and lay out the responsibilities of all data stakeholders (including what happens if a researcher leaves the institution). Due to local differences, the ideal policy contents will vary between institutions and countries.²⁶

There are several institutional policies that we recommend for review: the University of New Hampshire, the University of Minnesota, and the University of Massachusetts. These policies feature clear, explicit, and thorough language about what researchers should and should not do with their data. For example, the University of New Hampshire's "Policy on Ownership, Management, and Sharing of Research Data" provides straightforward definitions for investigators, research, research data, ownership, custodianship, and stewardship.²⁷ It acknowledges the authority of the investigators to do their own research, provides clear inclusion and exclusion of what constitutes research data, and defines roles and authority between the university administration and the investigator. Likewise, the "Research Data Management: Archiving, Ownership, Retention, Security,

Storage, and Transfer Policy” at the University of Minnesota is an example of direct writing.²⁸ The policy provides details on ownership and stewardship, data retention and archiving, research data transfer, researcher obligations, and data security. Specifically, this policy defines the role of the university libraries under the extensive responsibilities section with a number of specific examples. The “Policy on Data Ownership, Retention, and Access” at the University of Massachusetts Amherst also provides detailed definitions and covers data ownership, custody, quality, retention, and access.²⁹ Of particular note is the statement “When a collaboration comes to an end, and data was created during the collaboration, each member of the collaboration shall retain access to that data.”³⁰

More general guidance on developing a research data management policy is provided by the Association of Southeastern Research Libraries in collaboration with the Southeastern Universities Research Association. The model policy is intended to be comprehensive, allowing institutions to select and adapt relevant sections as appropriate. The model includes suggested statements on the purpose of the policy, data ownership, stakeholders and their responsibilities, and potential related institutional policies.³¹

There are a variety of motivations for institutions to develop data policies. For example, universities have an interest in promoting and preserving the reputation of the institution and the researcher: where good data is known to be a product of the institution and its researchers, both entities can gain recognition for the data and research generated. Good policies may also prevent reputational damage when data is missing, lost, or found to be fraudulent. Another goal of an institutional data policy is to improve opportunities for commercialization, as controlling access to data and maintaining good data preservation and documentation are integral to patent applications. Finally, universities have a specific goal of data retention for educational reuse, as data is frequently shared between faculty and students in a “gift” culture that introduces students and early career researchers to the field.³² Overall, however, institutional data policy is frequently focused on control of research data, which is sometimes at odds with mandates to curate this data for sharing with others.

Journal Data Policies

Journal data policies add further complexity to the data policy landscape. These policies align with some of the recent changes to funding agency policies by pushing for greater access to research data. While still not ubiquitous in scholarly publishing, there are increasing journal and publisher requirements for researchers to make the supporting data available alongside the published journal article.

The actual journal requirements for data sharing fall on a spectrum from strict to loose. The *Public Library of Science* (PLOS) family of journals caused

controversy in 2014 for being one of the first large journals to strictly require data availability as a condition of publication.³³ Other journals, such as *Science* and *Nature*, expected researchers who published within their pages to provide data as requested but did not explicitly require data to be made openly available at the time of publication.³⁴ A further trend is data journals, where only the data with some supporting metadata is submitted for peer review.³⁵ We should be aware that journals in our own field are starting to enact similar expectations, such as for the *Journal of Librarianship and Scholarly Communication (JLSC)*.³⁶

Beyond the basic expectation that data be made available, journals often recommend places for researchers to place their data to be in compliance with the policy. For journals with loose sharing expectations, it is often enough to simply provide access to the data when contacted rather than placing the data in a specific repository. For journals with strict data requirements, the journal may recommend a specific repository for data deposit, such as *JLSC*'s recommendation of its Dataverse instance,³⁷ or provide a list of recommended repositories across a variety of disciplines and subdisciplines.³⁸ Local institutional repositories run by libraries often do not appear in these directories or are listed with qualifications when they are.³⁹ Overall, journal policies reinforce the new data-sharing requirements of funder data policies and often take them a step further by specifying the preferred data repository for hosting.

Journals have their own motivations for enacting data policies. The principal incentive is to increase the reproducibility of the articles these journals publish. Greater scrutiny of research data can prevent the publication of problematic research and ensure that any subsequent retractions are easier to identify and resolve, both of which improve the quality and reputation of a journal. Open-access journals also have an altruistic motivation to expand their open mission into the data realm.

Navigating the Data Policy Landscape for Curation

Libraries undertaking data curation must be aware of funding agency, institutional, and journal data policies as these policies can directly affect local curation practices. Part of this awareness requires the ability to navigate the variances that frequently exist between the policy types. Thankfully, there are also a few areas of policy agreement that can further strengthen curation efforts.

With respect to policy agreement, both funder and institutional policies often include a requirement about data retention after the end of project. This is a direct response to the fact that researchers often have difficulty with data

retention, with Vines and colleagues finding that research data availability falls by approximately 17 percent per year after the paper is published due to the data becoming “either lost or on inaccessible storage.”⁴⁰ Having a mandated policy on retention provides leverage when working with researchers, who often think of retention in terms of long-term storage instead of involving the preservation actions necessary to make sure that the data remains usable in the future.⁴¹ By relying on the policies, we can ensure that data remains not only available but usable well after a project is complete.

However, while funder and institutional data policies often include retention mandates, retention times can sometimes conflict. The minimum retention period for data from government-funded research, per the US Office of Management and Budget (OMB) Uniform Guidance, is three years after the completion of the grant.⁴² Where data retention times are stated in university policy, they can often be three, five, or seven years, or a fixed time may not be specified.⁴³ Retention periods may also vary by discipline. This creates confusion for researchers in how long they actually need to retain data and whose policy takes precedence. In practice, longer retention times are preferred, especially in light of a two recent retractions of six- and eight-year-old papers where the original data could not be located to address concerns about the research.⁴⁴ Retention is unfortunately more complicated for sensitive data; in this case, it may be best to refer questions to the local institutional review board (IRB), the institution’s chief information officer, or similar IT representatives to determine local practice. In general, libraries should recommend that stated retention times be treated as minimums, with a preference for longer, but not indefinite, retention periods.

A second area of overlap between institutional and funder policies is that responsibility for the data often falls to both the researcher and the university. US funding agency policy places sharing and retention responsibility on the principal investigator (PI) of the grant in addition to mandating compliance measures from the university overall. Institutional policy, on the other hand, often designates the PI as the data steward who makes most of the decisions about the data while the university is the actual data owner. This further varies by institution and disciplinary practices. In general, the institution is held responsible for the compliance of its researchers and has a financial interest in meeting these requirements. In terms of data curation efforts, these shared responsibilities lend authority to libraries to preserve data on behalf of the university and its commitments, as libraries are a natural home for this type of work.

There is a downside to this overlap, as the university will not often exert its claim of data ownership under local policy unless extreme measures are involved. These measures can include researcher misconduct, avoiding sensitive data breaches and large-scale audits, and issues when prestigious research is in-

volved or where the university has a large financial stake in the research or research products, in addition to routine compliance requirements from funders. The 2015 court case between the University of California–San Diego (UCSD) and the University of Southern California (USC) illustrates such an example. UCSD sued USC and former UCSD researcher Paul Aisen for attempts to cut UCSD off from grant money and the longitudinal data from the Alzheimer’s Disease Cooperative Study when the PI, Aisen, tried to move the center and many of its researchers from UCSD to USC.⁴⁵ In this case, UCSD used its backing from the NIH, which awarded the grant to UCSD and wished to continue to do so, and its data ownership policy to block Aisen and USC from their attempts to transfer the research project. While many researchers have likely left UCSD in possession of their data and grant funding, the prestige and value of this research prompted UCSD to exert its claim to research via its data policy. As research funding becomes more competitive, such issues are likely to arise more frequently.

These ownership issues may be further complicated in the case of unfunded research, collaborative research, or research where there is not a sole primary investigator at one institution. Researchers may want to share their data but feel confused when policy is not clear about external collaborative data sharing but still requires institutional ownership of the data.

Journal data policies deviate from funder and institutional policy in this area in that they rarely identify institutions as having any role at all in policy compliance. This is evident by how infrequently institutional repositories show up in lists of recommended repositories and the qualifications upon them, such as minting DataCite DOIs and placing data in an external backup repository, when they do.⁴⁶ It is useful to be aware of these external requirements when developing repository services as well as actively promoting institutional repositories to journals as a way to satisfy their data-sharing requirements. An example of this promotion comes from a group of data librarians and curators called DataCure who in 2015 called upon PLOS to include institutional repositories as a recommended place for archiving data.⁴⁷

Most often, funding agency, institutional, and journal data policies disagree because the three policy types have fundamentally different intents. Funding agencies are usually concerned with data management, preservation, and sharing as they seek to prevent duplication and improve return on investment. In contrast, institutional data policies are more focused on data ownership and data control as they seek to maintain reputation and commercial control of intellectual property. Journal data policies, on the other hand, aim to improve the reproducibility of the journal’s published articles by providing access to the corresponding data. All policy types aim to lengthen the life cycle of research data, but two do so by promoting openness and while the third does so by putting restrictions on the data.⁴⁸ While the OECD Principles, OSTP Memo, and

Canadian council policies demonstrate the emerging standardization of data policies across the major government funding agencies,⁴⁹ no similar motion has yet occurred for institutional and journal data policies. Therefore, libraries engaging in data curation have a role in developing institutional data policy where it does not exist and lobbying for the inclusion of local data repositories in current and future journal data policies.

Another challenge to curation is that the three policy types have different enforcement mechanisms. Funding agencies have more leverage here as they can withhold money from those institutions that do not comply. Universities seldom have this option for enforcement. Journals can either refuse to publish articles by noncompliant researchers or retract them later.⁵⁰ Additionally, many researchers may not think to look to their libraries for support, and libraries rarely have the authority to enforce improved data curation practices, which compounds these curation problems.⁵¹ Libraries involved in data curation should consider other motivations for researcher participation in data curation besides direct compliance.

Finally, one of the biggest challenges comes from when policies are diametrically opposed. The question then becomes: which policy wins? There is no clear answer to this question at present, so local practice may vary as institutions continue to develop data curation policies and services. Libraries, however, already support researchers in evaluating journals for publishing and can apply that skill set here, holding a key position from which to identify where policies conflict and to collaborate with administrators, researchers, and journal editors to resolve the effects of disparate policies on data curation.

Navigating this shifting policy landscape can be a challenge for libraries working to curate research data. There are, however, many things that libraries can do in this area:

- Identify opportunities for the library to act on behalf of the institution and its obligations to preserve and retain data.
- Advocate locally that the library is a natural home for these tasks, which might not get accomplished without the library's leadership.
- Collaborate with institutional administrators to either develop or improve institutional data policies.
- Be proactive in advocating the library's role in compliance with journal editors.
- Leverage existing policies to promote services.
- Provide guidance to researchers on complying with (sometimes conflicting) policy requirements.

There is no one best way to navigate the changing policy landscape, but by being aware of the myriad requirements, libraries can use them to the best advantage.

Summary

Libraries engaged with data curation must be knowledgeable about the funding agency, institutional, and journal data policies that influence researcher responsibilities. Awareness of these evolving policies will enhance the library services for research data curation. We also have the opportunity to influence development or modification of our institutional policies to improve local data curation practices. Future navigation of policies will be important until further clarity and harmonization are established between funding agencies, institutions, and journals.

Notes

1. National Institutes of Health, "NIH Data Sharing Policy and Implementation Guidance," Last updated March 5, 2003, http://grants.nih.gov/grants/policy/data_sharing/data_sharing_guidance.htm.
2. Sally Rockey, "2014 By the Numbers," *Rock Talk* (blog), NIH Extramural Nexus, December 31, 2014, <https://nexus.od.nih.gov/all/2014/12/31/2014-by-the-numbers/>.
3. National Institutes of Health, "NIH Public Access Policy Details," accessed October 27, 2015, <https://publicaccess.nih.gov/policy.htm>.
4. National Science Foundation, "Dissemination and Sharing of Research Results," November 30, 2010, <http://www.nsf.gov/bfa/dias/policy/dmp.jsp>.
5. National Science Foundation, "Plans for Data Management and Sharing of the Products of Research," in chapter 2, "Proposal Preparation Instructions," *Proposal and Award Policies and Procedures Guide*, NSF 15-1, OMB 3145-0058 (Washington, DC: Office of Management and Budget, 2014), http://www.nsf.gov/pubs/policydocs/pappguide/nsf15001/gpg_2.jsp#dmp.
6. National Science Foundation Engineering Directorate, *Data Management for NSF Engineering Directorate Proposals and Awards* (Arlington, VA: National Science Foundation), accessed November 17, 2015, http://nsf.gov/eng/general/ENG_DMP_Policy.pdf.
7. National Science Foundation, *Division of Ocean Sciences Sample and Data Policy*, NSF 11060 (Arlington, VA: National Science Foundation, May 2011), <http://www.nsf.gov/pubs/2011/nsf11060/nsf11060.pdf>.
8. Regina Raboin, Rebecca Reznik-Zellen, and Dorothea Salo, "Forging New Service Paths: Institutional Approaches to Providing Research Data Management Services," *Journal of eScience Librarianship* 1, no. 3 (2012), doi:10.7191/jeslib.2012.1021; Karen Antell, Jody Bales Foote, Jaymie Turner, and Brain Shults, "Dealing with Data: Science Librarians' Participation in Data Management at Association of Research Libraries Institutions," *College and Research Libraries* 75, no. 4 (July 1, 2014): 557–74, doi:10.5860/crl.75.4.557.
9. John P. Holdren, "Increasing Access to the Results of Federally Funded Scientific Research," Memorandum for the Heads of Executive Departments and Agencies, Office of Science and Technology Policy, Executive Office of the President, February 22, 2013, http://www.whitehouse.gov/sites/default/files/microsites/ostp/ostp_public_access_memo_2013.pdf.
10. Barack Obama, "Executive Order: Making Open and Machine Readable the New Default for Government Information," May 9, 2013, <http://www.whitehouse.gov/the-press-office/2013/05/09/executive-order-making-open-and-machine-readable-new-default-government->

11. Organisation for Economic Co-operation and Development, *OECD Principles and Guidelines for Access to Research Data from Public Funding* (Paris: OECD Publishing, April 2007), <http://www.oecd.org/sti/sci-tech/oecdprinciplesandguidelinesforaccesstoresearchdatafrompublicfunding.htm>.
12. European Commission, Horizon 2020 homepage, 2014, <https://ec.europa.eu/programmes/horizon2020/>.
13. Research Councils UK, "RCUK Common Principles on Data Policy," accessed November 1, 2015, <http://www.rcuk.ac.uk/research/datapolicy/>; Wellcome Trust, "Policy on Data Management and Sharing," accessed October 21, 2014, <http://www.wellcome.ac.uk/about-us/policy/policy-and-position-statements/wtx035043.htm>.
14. Engineering and Physical Sciences Research Council, "EPSRC Policy Framework on Research Data," March 2011, <https://www.epsrc.ac.uk/about/standards/researchdata/>.
15. Digital Curation Centre, "Overview of Funders' Data Policies," accessed October 21, 2014, <http://www.dcc.ac.uk/resources/policy-and-legal/overview-funders-data-policies>; L. Horton and Digital Curation Centre, "Overview of UK Institution RDM Policies," Digital Curation Centre, 2014, <http://www.dcc.ac.uk/resources/policy-and-legal/institutional-data-policies>.
16. Canadian Institutes of Health Research, Natural Sciences and Engineering Research Council of Canada, and Social Sciences and Humanities Research Council of Canada, "Draft Tri-Agency Statement of Principles on Digital Data Management," July 9, 2015, last modified July 20, 2015, <http://www.science.gc.ca/default.asp?lang=En&n=83F7624E-1>.
17. "Canada's Action Plan on Open Government 2014–16," chapter IV-B, "Open Data—Open Data without Borders," Open Government website, accessed February 16, 2016, <http://open.canada.ca/en/content/canadas-action-plan-open-government-2014-16#ch4-2>.
18. Bill and Melinda Gates Foundation, "Bill & Melinda Gates Foundation Open Access Policy," accessed January 5, 2015, <http://www.gatesfoundation.org/how-we-work/general-information/open-access-policy>.
19. Richard Van Noorden, "Gates Foundation Announces World's Strongest Policy on Open Access Research," *Nature News Blog*, November 21, 2014, <http://blogs.nature.com/news/2014/11/gates-foundation-announces-worlds-strongest-policy-on-open-access-research.html>.
20. Ford Foundation, "Ford Foundation Expands Creative Commons Licensing for All Grant-Funded Projects," news release, February 3, 2015, <https://www.fordfoundation.org/the-latest/news/ford-foundation-expands-creative-commons-licensing-for-all-grant-funded-projects/>.
21. Institute for Museum and Library Services, *General Terms and Conditions for IMLS Discretionary Grant and Cooperative Agreement Awards: For Awards Made After December 26, 2014* (Washington, DC: Institute for Museum and Library Services, March 30, 2015), 15, https://www.imls.gov/sites/default/files/gtc_afterdec2014_0315.pdf.
22. Christine L. Borgman, "The Conundrum of Sharing Research Data," *Journal of the American Society for Information Science and Technology* 63, no. 6 (June 2012): 1059–78, doi:10.1002/asi.22634.
23. David Fearon Jr., Betsy Gunia, Sherry Lake, Barbara E. Pralle and Andrew L. Sallans, *Research Data Management Services, SPEC Kit 334* (Washington, DC: Association of Research Libraries, July 2013), <http://publications.arl.org/Research-Data-Management-Services-SPEC-Kit-334/>.

24. Kristin Briney, Abigail Goblen, and Lisa Zilinski, "Do You Have an Institutional Data Policy? A Review of the Current Landscape of Library Data Services and Institutional Data Policies," *Journal of Librarianship and Scholarly Communication* 3, no. 1 (Summer 2015): eP1232, doi:10.7710/2162-3309.1232.
25. Ibid.
26. Ibid.; Horton and Digital Curation Centre, "Overview of UK Institution RDM Policies."
27. University of New Hampshire, "C. UNH Policy on Ownership, Management, and Sharing of Research Data | University System of New Hampshire," USNH Online Policy Manual, accessed November 17, 2015, <https://www.usnh.edu/policy/unh/viii-research-policies/c-unh-policy-ownership-management-and-sharing-research-data>.
28. University of Minnesota, "Research Data Management: Archiving, Ownership, Retention, Security, Storage, and Transfer," Administrative Policy, accessed November 17, 2015, <http://policy.umn.edu/research/researchdata>.
29. University of Massachusetts Amherst, *Special Report of the Research Council Concerning the Policy on Data Ownership, Retention, and Access at the University of Massachusetts Amherst*, Sen. Doc. No. 06-047, May 18, 2006, http://www.umass.edu/research/sites/default/files/policy_on_data_ownership_retention_and_access_0.pdf.
30. Ibid., 4.
31. Nathan Hall, Bill Corey, Wendy Mann, Tom Wilson, and ASERL/SURA Research Data Coordinating Committee, *Model Language for Research Data Management Policies* (Durham, NC: Association of Southeastern Research Libraries, January 2013), http://www.aserl.org/wp-content/uploads/2013/01/ASERL-SURA_Model_Language_RDM_Policy_Language_FINAL.pdf.
32. Borgman, "The Conundrum of Sharing Research Data."
33. Liz Silva, "PLOS' New Data Policy: Public Access to Data," *EveryONE* (blog), February 24, 2014, <http://blogs.plos.org/everyone/2014/02/24/plos-new-data-policy-public-access-data-2/>; Theo Bloom, "PLOS' New Data Policy: Part Two," *EveryONE* (blog), March 8, 2014, <http://blogs.plos.org/everyone/2014/03/08/plos-new-data-policy-public-access-data/>; Ivan Oransky, "Following Criticism, PLOS Apologizes, Clarifies New Data Policy," Retraction Watch website, March 9, 2014, <http://retractionwatch.com/2014/03/09/following-criticism-plos-apologizes-clarifies-new-data-policy/>; Carl Boettiger, "Plos Data Sharing Policy Reflections," May 30, 2014, <http://www.carlboettiger.info/2014/05/30/PLoS-data-sharing-policy-reflections.html>.
34. *Science*, "Science: Editorial Policies," July 2, 2015, <http://www.sciencemag.org/authors/science-editorial-policies>; Nature Publishing Group, "Availability of Data, Material, and Methods," Authors and Referees: Policies, November 18, 2014, <http://www.nature.com/authors/policies/availability.html#data>.
35. Katherine G. Akers, "A Growing List of Data Journals," *Data@MLibrary* (blog), May 9, 2014, <https://mlibrarydata.wordpress.com/2014/05/09/data-journals/>; Pauline Ward, "Sources of Dataset Peer Review," DataShare wiki, last modified January 12, 2016, <https://www.wiki.ed.ac.uk/display/dataset+peer+review>.
36. JLSC Editorial Board, "The Article Is Not Enough: Introducing the JLSC Data Sharing Policy," *Journal of Librarianship and Scholarly Communication* 2, no. 3 (2014), doi:10.7710/2162-3309.1186.
37. "Journal of Librarianship and Scholarly Communication Instructions for Authors," accessed February 16, 2016, <http://jlsc-pub.org/about/submissions/#data>.
38. BioMed Central, "Editorial Policies: Availability of Data and Materials," accessed Febru-

- ary 7, 2016, <https://www.biomedcentral.com/submissions/editorial-policies#availability+of+data+and+materials>; *PLOS ONE*, “Data Availability,” 2016, <http://journals.plos.org/plosone/s/data-availability>.
39. *Scientific Data*, “Recommended Repositories,” accessed February 7, 2016, <http://www.nature.com/sdata/data-policies/repositories>.
 40. Timothy H. Vines, Arianne Y. K. Albert, Rose L. Andrew, Florence Débarre, Dan G. Bock, Michelle T. Franklin, Kimberly J. Gilbert, et al., “The Availability of Research Data Declines Rapidly with Article Age,” *Current Biology* 24, no. 1 (January 2014): 95, doi:10.1016/j.cub.2013.11.014.
 41. Johns Hopkins University Data Management Services, “About Storing and Archiving Your Research Data,” accessed November 2, 2015, <https://dmp.data.jhu.edu/preserve-share-research-data/preserve-archive/>.
 42. Office of Management and Budget, “Circular A-110 Revised 11/19/93 As Further Amended 9/30/99,” White House website, last updated September 30, 1999, http://www.whitehouse.gov/omb/circulars_a110.
 43. University of New Hampshire, “C. UNH Policy on Ownership”; University of Wisconsin-Madison, “Policy on Data Stewardship, Access, and Retention,” accessed March 4, 2016, <https://kb.wisc.edu/gradsch/page.php?id=34404>; University of Iowa, “6g. Data Management: Research Records,” Researcher Handbook, accessed March 4, 2016, <http://researcherhandbook.research.uiowa.edu/6g-data-management-research-records>; University of Minnesota, “Research Data Management.”
 44. Ivan Oransky, “JCI Paper Retracted for Duplicated Panels after Authors Can’t Provide Original Data,” Retraction Watch website, July 19, 2013, http://retractionwatch.com/2013/07/19/jci-paper-retracted-for-duplicated-panels-after-authors-cant-provide-original-data/?utm_source=dlvr.it&utm_medium=twitter/; Ross Keith, “Author Objects to Retraction for Not ‘Faithfully Represented’ Immunology Figures,” Retraction Watch website, October 2, 2015, <http://retractionwatch.com/2015/10/02/author-objects-to-retraction-for-not-faithfully-represented-immunology-figures/>.
 45. Bradley J. Fikes, “UC San Diego Sues USC and Scientist, Alleging Conspiracy to Take Funding, Data,” *LA Times*, July 5, 2015, <http://www.latimes.com/local/education/la-me-ucsd-lawsuit-20150706-story.html>; Scott Jaschik, “UCSD 1, USC 0,” *Inside Higher Ed*, July 27, 2015, <https://www.insidehighered.com/news/2015/07/27/ucsd-wins-key-round-legal-fight-usc-over-huge-research-project>.
 46. *Scientific Data*, “Recommended Repositories.”
 47. Stephen Abrams, Eugene Barsky, Kristin Briney, K. Jane Burpee, Jake Carlson, Heather Coates, Jennifer Doty, et al., “Open Letter to PLoS—Libraries Role in Data Curation,” Datacure, November 2015, <https://datacurepublic.wordpress.com/open-letter-to-plos-libraries-role-in-data-curation/>.
 48. Spencer D. C. Keralis, Shannon Stark, Martin Halbert, and William E. Moen, “Research Data Management in Policy and Practice: The DataRes Project,” In *Research Data Management: Principles, Practices, and Prospects*, CLIR Publication No. 160 (Washington, DC: Council on Library and Information Resources, 2013), 16.
 49. Organisation for Economic Co-operation, *OECD Principles and Guidelines*; Holdren, “Increasing Access to the Results of Federally Funded Scientific Research”; Canadian Institutes of Health Research, Natural Sciences and Engineering Research Council of Canada, and Social Sciences and Humanities Research Council of Canada., “Draft Tri-Agency Statement of Principles.”

50. Chelsey Coombs, "Neuroscience Paper Retracted after Colleagues Object to Data Publication," Retraction Watch website, December 31, 2015, <http://retractionwatch.com/2015/12/31/neuroscience-paper-retracted-after-colleagues-object-to-data-publication/>.
51. Raboin, Reznik-Zellen, and Salo, "Forging New Service Paths."

Bibliography

- Abrams, Stephen, Eugene Barsky, Kristin Briney, K. Jane Burpee, Jake Carlson, Heather Coates, Jennifer Doty, et al. "Open Letter to PLoS—Libraries Role in Data Curation." DataCure website, November 2015. <https://datacurepublic.wordpress.com/open-letter-to-plos-libraries-role-in-data-curation/>.
- Akers, Katherine G. "A Growing List of Data Journals." *Data@MLibrary* (blog), May 9, 2014. <https://mlibrarydata.wordpress.com/2014/05/09/data-journals/>.
- Antell, Karen, Jody Bales Foote, Jaymie Turner, and Brian Shults. "Dealing with Data: Science Librarians' Participation in Data Management at Association of Research Libraries Institutions." *College and Research Libraries* 75, no. 4 (July 2014): 557–74. doi:10.5860/crl.75.4.557.
- Bill and Melinda Gates Foundation. "Bill & Melinda Gates Foundation Open Access Policy." Accessed January 5, 2015. <http://www.gatesfoundation.org/how-we-work/general-information/open-access-policy>.
- BioMed Central. "Editorial Policies: Availability of Data and Materials." Accessed February 7, 2016. <https://www.biomedcentral.com/submissions/editorial-policies#availability+of+data+and+materials>.
- Bloom, Theo. "PLOS' New Data Policy: Part Two." *EveryONE* (blog), March 8, 2014. <http://blogs.plos.org/everyone/2014/03/08/plos-new-data-policy-public-access-data/>.
- Boettiger, Carl. "Plos Data Sharing Policy Reflections," May 30, 2014. <http://www.carlboettiger.info/2014/05/30/PLoS-data-sharing-policy-reflections.html>.
- Borgman, Christine L. "The Conundrum of Sharing Research Data." *Journal of the American Society for Information Science and Technology* 63, no. 6 (June 2012): 1059–78. doi:10.1002/asi.22634.
- Briney, Kristin, Abigail Goben, and Lisa Zilinski. "Do You Have an Institutional Data Policy? A Review of the Current Landscape of Library Data Services and Institutional Data Policies." *Journal of Librarianship and Scholarly Communication* 3, no. 1 (Summer 2015): eP1232. doi:10.7710/2162-3309.1232.
- "Canada's Action Plan on Open Government 2014–16." Chapter IV-B, "Open Data—Open Data without Borders." Open Government website. Accessed February 16, 2016. <http://open.canada.ca/en/content/canadas-action-plan-open-open-government-2014-16#ch4-2>.
- Canadian Institutes of Health Research, Natural Sciences and Engineering Research Council of Canada, and Social Sciences and Humanities Research Council of Canada. "Draft Tri-Agency Statement of Principles on Digital Data Management," July 9, 2015. Last modified July 20, 2015. <http://www.science.gc.ca/default.asp?lang=En&n=83F7624E-1>.
- Coombs, Chelsey. "Neuroscience Paper Retracted after Colleagues Object to Data Publication." Retraction Watch website, December 31, 2015. <http://retractionwatch.com/2015/12/31/neuroscience-paper-retracted-after-colleagues-object-to-data-publication/>.

- com/2015/12/31/neuroscience-paper-retracted-after-colleagues-object-to-data-publication/.
- Digital Curation Centre. "Overview of Funders' Data Policies." Accessed October 21, 2014. <http://www.dcc.ac.uk/resources/policy-and-legal/overview-funders-data-policies>.
- Engineering and Physical Sciences Research Council. "EPSRC Policy Framework on Research Data," March 2011. <https://www.epsrc.ac.uk/about/standards/researchdata/>.
- European Commission. Horizon 2020 homepage. 2014. <https://ec.europa.eu/programmes/horizon2020/>.
- Fearon, David Jr., Betsy Gunia, Sherry Lake, Barbara E. Pralle, and Andrew L. Sallans. *Research Data Management Services, SPEC Kit 334*. Washington, DC: Association of Research Libraries, July 2013. <http://publications.arl.org/Research-Data-Management-Services-SPEC-Kit-334/>.
- Fikes, Bradley J. "UC San Diego Sues USC and Scientist, Alleging Conspiracy to Take Funding, Data." *LA Times*. July 5, 2015. <http://www.latimes.com/local/education/la-me-ucsd-lawsuit-20150706-story.html>.
- Ford Foundation. "Ford Foundation Expands Creative Commons Licensing for All Grant-Funded Projects." News release. February 3, 2015. <https://www.fordfoundation.org/the-latest/news/ford-foundation-expands-creative-commons-licensing-for-all-grant-funded-projects/>.
- Hall, Nathan, Bill Corey, Wendy Mann, Tom Wilson, and ASERL/SURA Research Data Coordinating Committee. *Model Language for Research Data Management Policies*. Durham, NC: Association of Southeastern Research Libraries, January 2013. http://www.aserl.org/wp-content/uploads/2013/01/ASERL-SURA_Model_Language_RDM_Policy_Language_FINAL.pdf.
- Holdren, John P. "Increasing Access to the Results of Federally Funded Scientific Research." Memorandum for the Heads of Executive Departments and Agencies, Office of Science and Technology Policy, Executive Office of the President, February 22, 2013. http://www.whitehouse.gov/sites/default/files/microsites/ostp/ostp_public_access_memo_2013.pdf.
- Horton, L., and Digital Curation Centre. "Overview of UK Institution RDM Policies." Digital Curation Centre, 2014. <http://www.dcc.ac.uk/resources/policy-and-legal/institutional-data-policies>.
- Institute for Museum and Library Services. *General Terms and Conditions for IMLS Discretionary Grant and Cooperative Agreement Awards: For Awards Made After December 26, 2014*. Washington, DC: Institute for Museum and Library Services, March 30, 2015. https://www.imls.gov/sites/default/files/gtc_afterdec2014_0315.pdf.
- Jaschik, Scott. "UCSD 1, USC 0." *Inside Higher Ed*, July 27, 2015. <https://www.insidehighered.com/news/2015/07/27/ucsd-wins-key-round-legal-fight-usc-over-huge-research-project>.
- JLSC Editorial Board. "The Article Is Not Enough: Introducing the JLSC Data Sharing Policy." *Journal of Librarianship and Scholarly Communication* 2, no. 3 (2014). doi:10.7710/2162-3309.1186.
- Johns Hopkins University Data Management Services. "About Storing and Archiving Your Research Data." Accessed November 2, 2015. <https://dmp.data.jhu.edu/preserve-share-research-data/preserve-archive/>.
- "*Journal of Librarianship and Scholarly Communication* Instructions for Authors." Accessed February 16, 2016. <http://jlsc-pub.org/about/submissions/#data>.

- Keith, Ross. "Author Objects to Retraction for Not 'Faithfully Represented' Immunology Figures." Retraction Watch website, October 2, 2015. <http://retractionwatch.com/2015/10/02/author-objects-to-retraction-for-not-faithfully-represented-immunology-figures/>.
- Keralis, Spencer D. C., Shannon Stark, Martin Halbert, and William E. Moen. "Research Data Management in Policy and Practice: The DataRes Project." In *Research Data Management: Principles, Practices, and Prospects*, 16–38. CLIR Publication No. 160. Washington, DC: Council on Library and Information Resources, 2013.
- National Institutes of Health. "NIH Data Sharing Policy and Implementation Guidance." Last updated March 5, 2003. http://grants.nih.gov/grants/policy/data_sharing/data_sharing_guidance.htm.
- . "NIH Public Access Policy Details." Accessed October 27, 2015. <https://publicaccess.nih.gov/policy.htm>.
- National Science Foundation. "Dissemination and Sharing of Research Results." November 30, 2010. <http://www.nsf.gov/bfa/dias/policy/dmp.jsp>.
- . *Division of Ocean Sciences Sample and Data Policy*. NSF 11060. Arlington, VA: National Science Foundation, May 2011. <http://www.nsf.gov/pubs/2011/nsf11060/nsf11060.pdf>.
- . "Plans for Data Management and Sharing of the Products of Research." In chapter 2, "Proposal Preparation Instructions," *Proposal and Award Policies and Procedures Guide*. NSF 15-1. OMB 3145-0058. Washington, DC: Office of Management and Budget, 2014. http://www.nsf.gov/pubs/policydocs/pappguide/nsf15001/gpg_2.jsp#dmp.
- National Science Foundation Engineering Directorate. *Data Management for NSF Engineering Directorate Proposals and Awards*. Accessed November 17, 2015. Arlington, VA: National Science Foundation. http://nsf.gov/eng/general/ENG_DMP_Policy.pdf.
- Nature Publishing Group. "Availability of Data, Material, and Methods." Authors and Referees: Policies, November 18, 2014. <http://www.nature.com/authors/policies/availability.html#data>.
- Obama, Barack. "Executive Order: Making Open and Machine Readable the New Default for Government Information." May 9, 2013. <http://www.whitehouse.gov/the-press-office/2013/05/09/executive-order-making-open-and-machine-readable-new-default-government->
- Office of Management and Budget. "Circular A-110 Revised 11/19/93 As Further Amended 9/30/99." White House website. Last updated September 30, 1999. http://www.whitehouse.gov/omb/circulars_a110.
- Oransky, Ivan. "Following Criticism, PLOS Apologizes, Clarifies New Data Policy." Retraction Watch website, March 9, 2014. <http://retractionwatch.com/2014/03/09/following-criticism-plos-apologizes-clarifies-new-data-policy/>.
- . "JCI Paper Retracted for Duplicated Panels after Authors Can't Provide Original Data." Retraction Watch website, July 19, 2013. http://retractionwatch.com/2013/07/19/jci-paper-retracted-for-duplicated-panels-after-authors-cant-provide-original-data/?utm_source=dlvr.it&utm_medium=twitter/.
- Organisation for Economic Co-operation and Development. *OECD Principles and Guidelines for Access to Research Data from Public Funding*. Paris: OECD Publishing, April 2007. <http://www.oecd.org/sti/sci-tech/oecdprinciplesandguidelinesforaccesstoresearchdatafrompublicfunding.htm>.

- PLOS ONE*. "Data Availability." 2016. <http://journals.plos.org/plosone/s/data-availability>.
- Raboin, Regina, Rebecca Reznik-Zellen, and Dorothea Salo. "Forging New Service Paths: Institutional Approaches to Providing Research Data Management Services." *Journal of eScience Librarianship* 1, no. 3 (2012). doi:10.7191/jeslib.2012.1021.
- Research Councils UK. "RCUK Common Principles on Data Policy." Accessed November 1, 2015. <http://www.rcuk.ac.uk/research/datapolicy/>.
- Rockey, Sally. "2014 By the Numbers." *Rock Talk* (blog), NIH Extramural Nexus, December 31, 2014. <https://nexus.od.nih.gov/all/2014/12/31/2014-by-the-numbers/>.
- Science*. "Science: Editorial Policies," July 2, 2015. <http://www.sciencemag.org/authors/science-editorial-policies>.
- Scientific Data*. "Recommended Repositories." Accessed February 7, 2016. <http://www.nature.com/sdata/data-policies/repositories>.
- Silva, Liz. "PLOS' New Data Policy: Public Access to Data." *EveryONE* (blog), February 24, 2014. <http://blogs.plos.org/everyone/2014/02/24/plos-new-data-policy-public-access-data-2/>.
- University of Iowa. "6g. Data Management: Research Records." Researcher Handbook. Accessed March 4, 2016. <http://researcherhandbook.research.uiowa.edu/6g-data-management-research-records>.
- University of Massachusetts Amherst. *Special Report of the Research Council Concerning the Policy on Data Ownership, Retention, and Access at the University of Massachusetts Amherst*. Sen. Doc. No. 06-047. May 18, 2006. http://www.umass.edu/research/sites/default/files/policy_on_data_ownership_retention_and_access_0.pdf.
- University of Minnesota. "Research Data Management: Archiving, Ownership, Retention, Security, Storage, and Transfer." Administrative Policy. Accessed November 17, 2015. <http://policy.umn.edu/research/researchdata>.
- University of New Hampshire. "C. UNH Policy on Ownership, Management, and Sharing of Research Data | University System of New Hampshire." USNH Online Policy Manual. Accessed November 17, 2015. <https://www.usnh.edu/policy/unh/viii-research-policies/c-unh-policy-ownership-management-and-sharing-research-data>.
- University of Wisconsin-Madison. "Policy on Data Stewardship, Access, and Retention." Accessed March 4, 2016. <https://kb.wisc.edu/gradsch/page.php?id=34404>.
- Van Noorden, Richard. "Gates Foundation Announces World's Strongest Policy on Open Access Research." *Nature News Blog*, November 21, 2014. <http://blogs.nature.com/news/2014/11/gates-foundation-announces-worlds-strongest-policy-on-open-access-research.html>.
- Vines, Timothy H., Arianne Y. K. Albert, Rose L. Andrew, Florence Débarre, Dan G. Bock, Michelle T. Franklin, Kimberly J. Gilbert, Jean-Sébastien Moore, Sébastien Renaut, and Diana J. Rennison. "The Availability of Research Data Declines Rapidly with Article Age." *Current Biology* 24, no. 1 (January 2014): 94–97. doi:10.1016/j.cub.2013.11.014.
- Ward, Pauline. "Sources of Dataset Peer Review." DataShare wiki. Last modified January 12, 2016. <https://www.wiki.ed.ac.uk/display/datashare/Sources+of+dataset+peer+review>.
- Wellcome Trust. "Policy on Data Management and Sharing." Accessed October 21, 2014. <http://www.wellcome.ac.uk/about-us/policy/policy-and-position-statements/wtx035043.htm>.